Response to Faculty Senate Comments on Teaching Certificate Program

Criteria	Faculty Senate Feedback	Action
Availability of Suitable Faculty	This is one that was implicit, given numbers of graduate students in Math and Statistics, but the GSC and graduate school like explicit statements about the particulars from everyone.	Added statement regarding faculty availability for teaching courses and conducting observations.
Link to University Strategic Goals	please specify.	Added language connecting program outcomes to WSU strategic plan
Admission requirements – must be consistent with WSU Graduate Programs	please specify	Added statement explicitly requiring consistency with WSU Graduate Program admission requirements.
Statement that S/F courses used toward major or degree	please specify	Added statement specifying all courses must be taken on a graded basis and cannot be taken as S/F.
Certificate fee	It appears that there is no certificate fee beyond what WSU requires, but again this should be stated. There is mention of a possible expansion of the certificate to non-degree students, and possible suggestion of revenue from that, but the committee felt that should be removed from this proposal. That would have to be a separate proposal, as I understand it.	Removed statements regarding non-degree students and possible revenue. Made explicit that no additional fee is required.
Part-time or full-time certificate student – separate rules	FT?	Added statement about timeline to degree being in line with WSU Graduate School for both full and part-time students.
Undergraduate degree from accredited post-secondary institution?	There are apparently some professional programs that do require an undergraduate degree, so this needs to be clarified as well.	Added explicit statement about needing an undergraduate degree from an accredited post-secondary institution consistent with the need for all students to be enrolled in a graduate program at WSU or University of Idaho.
Required admission to Graduate School before taking first course	This also was implicit; please make this explicit.	Added statement requiring admission to the Graduate School prior to taking first course.
Student must maintain 3.0 GPA in certificate and/or grad courses	This is a graduate school requirement, but again a sentence is needed about minimum/maintenance of GPA.	Added statement regarding GPA requirements.

On probation or suspension statement	Please add a statement about probation or suspension.	Added statement allowing for continuation of program after successful reinstatement by the graduate school.
Accept transfer credits?	please add a statement about whether or not transfer credits may be accepted.	Added statement regarding the ability to apply to transfer one course.
	One substantive concern is how the teaching observations will be administered (how it will be determined who will conduct the observations, where or to whom are the observations submitted, and whether there is form/template/rubric everyone will use and students will have access to before the observations).	Observation rubric has been included and a committee of current faculty has been formed to serve as the pool of trained observers.

Department of
Mathematics & Statistics
College of Arts & Sciences
Washington State University

Justification for Graduate Certificate in Teaching College Mathematics

The Department of Mathematics and Statistics has over 100 graduate students enrolled in their graduate program. Roughly half of all graduating students get positions as an instructor or professor at an institution for higher education (from community colleges to institutions offering PhD's). Further, in a survey of our graduate students in 2018, more than half those responding said they were interested in a certificate for teaching college mathematics. While our current model for preparing these students for the college classroom is working, we believe we can elevate this program and make it a strength of our department and university. In addition, this program aligns with the second goal of the WSU Strategic Plan, Student Experience. Specifically we hope to increase career development resources for our graduate students and to improve our current graduate students' teaching abilities, thereby enhancing the undergraduate academic experience.

The proposed certificate program requires students to take 12 credit hours in mathematics education courses and to gain teaching experience in courses both at the pre-collegiate level (e.g. MATH 100, 103) and the collegiate level (e.g. MATH 140, MATH 171). Furthermore, students will receive feedback from faculty evaluators and will write a reflection on the pedagogical strategies based on the faculty members' written observations. The Teaching Certificate Committee (potential faculty for this committee listed below) will organize and coordinate these observational sessions. Each student, before being observed, will meet with a faculty member to discuss the process and rubric. This requirement is formative in nature and is meant to support graduate students as they grow as instructors. Observations and student reflections are to be submitted to the Program Director, who will also serve as chair of the this committee.

A "Statement of Teaching Philosophy" (required to obtain permanent positions at higher education institutions) is also a requirement. A sample rubric for the Statement of Teaching Philosophy is included in supplementary information. Because the courses already exist and a teaching statement is required as part of one of the required courses, the program will require only minimal administrative effort to implement.

To help make the program run more smoothly, we have a contingency plan for when a student is unable to take a necessary course, either because of limited Pullman campus access or due to the rare cancelation of a course. On a case-by-case basis, one course may be allowed to be substituted. The following courses offered by the Department of Teaching and Learning (designed for teaching in the STEM discipline K-12 level) could be accepted as a substitution:

PO Box 643113, Pullman, WA 99164-3113
509-335-3926 • Fax: 509-335-1188 • www.math.wsu.edu

- MATH 531 - Intersections of Culture and Mathematics -> T&L 512 Language and Cultural Factors in Mathematics

- MATH 534 - Theories of Learning in Mathematics -> T&L 581 Learning and Development in Math and Sci

- MATH 535 - Paradigms in Mathematics Education Research -> T&L 531 Frameworks for Research in Math and Sci Education

A request for a substitution will be submitted to the Program Director for consideration.

To keep the program manageable with the personnel resources available to the Department of Mathematics and Statistics, we ~~initially~~ propose that only interested ~~math~~ graduate students in a Department of Mathematics and Statistics graduate program be allowed into the program. Exceptions that will be considered on a case-by-case basis include persons at University of Idaho and~~,~~ WSU students from other departments~~, or those outside the university desiring continuing education. As more resources become available we could then market this program more broadly~~. All courses are currently on rotation and offered regularly in the Department of Mathematics and Statistics, so no additional faculty resources will need to be committed to offer~~ing~~ additional courses. The following faculty of the Department of Mathematics and Statistics have expressed interest in supporting the program and assisting in classroom observations: William Hall, Lynn Schreyer, Daniel Reiss, Sandra Cooper, Matthew Hudelson, Sergey Lapin, and Kimberly Vincent.

Overall, the program allows students to become familiar with modern theories of learning and research-based pedagogical strategies that are effective for the college mathematics classroom. Students earning the certificate will be able to keep up with advances in collegiate pedagogy by being aware of prominent mathematics education research journals and regional/national conferences, as well as be familiar with professionals who research the teaching and learning of undergraduate mathematics at WSU and around the country. Upon receiving the certificate, students will have the ability and opportunities to explore mathematics education research as a supplement to their work in the classroom should they be interested.

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Certificate in Teaching College Mathematics

Description: This program allows students to become familiar with modern theories of learning and research-based pedagogical strategies that are effective for the college mathematics classroom. Students will complete coursework, teach undergraduate courses, be evaluated by experienced faculty, and write a teaching philosophy statement to better prepare them for a career involving post-secondary instruction.

Prerequisite: Enrolled in a Department of Mathematics and Statistics graduate program at any campus. Exceptions can be requested by emailing the graduate coordinator. Applicants must have and maintain a cumulative GPA of 3.0, be in good academic standing, be admitted to the Graduate School, and have a record consistent with the admissions guidelines for the Graduate School, including completing an undergraduate degree from an accredited post-secondary institution.

Fees: There is no additional certificate fee for this program beyond the Graduate School certificate application fee.

Course Requirements

Required Courses (6 credit hours total):

- MATH 533 Teaching College Mathematics (1 credit hour, three times)
- MATH 532 Advanced Mathematical Thinking (3 hours)

Elective Courses (Choose at least two, 6 credit hours total)*:

- MATH 531 - Intersections of Culture and Mathematics (3 cr)
- MATH 534 - Theories of Learning in Mathematics (3 cr)
- MATH 535 – Research Paradigms in Mathematics Education (3 cr)
- MATH 590 - Topics in Mathematics Education (variable credit, repeatable)

*In exceptional cases one substitution will be allowed. Please contact the Program Director.

Other Requirements:

- Experience as instructor of record or teaching assistant for at least two semesters of undergraduate mathematics courses.
- Experience as instructor of record or teaching assistant for both developmental (courses listed below MATH 140) and college-level mathematics (MATH 140 and above).
- Submission of at least two formal observations of your teaching by faculty members in the department. These observations should be accompanied by a reflection on your pedagogical strategies in light of the written observation.

- Submission of a satisfactory written Teaching Statement, which will be drafted during coursework in MATH 533.
- All courses must be taken on a graded basis, and cannot be completed as S/F.
- Timeline to degree and other graduate school policies for full-time and part-time students will apply. Part-time students are eligible for the program.
- Students in academically deficient status (or on probation/suspension) may continue pursuing the certificate program upon reinstatement by their graduate department. To complete the certificate program, students must have a 3.0 GPA in all courses counted toward their certificate by the semester of anticipated completion.
- Completion of at least 18 graded credit hours with a 3.0 GPA or above in their graduate program is required, which may include courses from this certificate program.
- One course may be evaluated for transfer credit by departmental faculty for a substitution of a course requirement.

Course Offerings:

Course	**Offered**
MATH 531	Every Fall
MATH 532	Even years (Spring)
MATH 533	Every semester
MATH 534	Odd years (Fall)
MATH 535	Odd years (Spring)
MATH 590	Infrequent

Sample Paths to Completion

Enter: Fall (odd year)
Fall 2021 – MATH 533
Spring 2022 – MATH 532, MATH 533
Fall 2022 – MATH 531, MATH 533
Spring 2023 – MATH 535

Enter: Fall (even year)
Fall 2020 – MATH 533
Spring 2021 – MATH 533
Fall 2021 – MATH 534 or MATH 531, MATH 533
Spring 2022 – MATH 532

Rubric for Statement of Teaching Philosophy

Possible Components	Weak - Significant Revision	Satisfactory – Some Revision	Excellent – Little Revision
Goals for Student Learning			
What knowledge, skills, and attitudes are important for student success? What are you preparing students for? What are the key challenges in the teaching/learning process?	Articulation of goals is unfocused, incomplete, or missing.	Goals are articulated although they may be too broad or not specific to the discipline. Goals may focus on basic knowledge, ignoring skills acquisition and affective change.	Goals are clearly articulated, specific, and go beyond surface knowledge level. May include skills, attitudes, career goals, etc. Goals are sensitive to the context of the instructor's discipline. They are concise but not exhaustive.
Teaching Methods			
What teaching methods do you employ? How does these methods help you reach your goals for student learning? Why are these methods appropriate?	Enactment of goals is not articulated. If there is an attempt at articulating teaching methods, it is basic and unreflective.	Description of teaching methods may not be clearly connected to goals or if connected, not well developed (seems like a list of what is done in the classroom). Methods are described but generically, no example of the instructor's use of the methods within the discipline is communicated.	Teaching methods are specific and thoughtful. Includes details and rationale about teaching methods. The methods are clearly connected to specific goals and are appropriate for those goals. Specific examples of the method in use within the disciplinary context are given.
Measuring Student Learning			
How do you know your goals for student learning are being met? What assessment tools do you use? How do these assessments contribute to student learning?	Assessment of goals is not articulated or mentioned only in passing.	Assessments are described, but not in connection to goals and teaching methods. Description is too general, with no reference to the motivation behind the assessments. There is no clear connection between the assessments and the priorities of the discipline.	Specific examples of assessment tools are clearly described. Assessment tools are aligned with teaching goals and teaching methods. Assessments reinforce the priorities and context of the discipline both in content and type.
Inclusivity			
How do your own and your students' identities (e.g. race, gender, class, etc.) background, experience affect the classroom?	Issues of inclusion are not addressed or addressed in an awkward manner. There is no connection to teaching practices.	Inclusive teaching is addressed but in a cursory manner or in a way that isolates it from the rest of the philosophy. Author briefly connects identity issues to aspects of his/her teaching.	Portrays a coherent philosophy of inclusive education that is integrated throughout the philosophy. Makes space for diverse ways of knowing, and/or learning styles. Discussion of roles is sensitive to historically underrepresented students. Demonstrates awareness of issues of equity within the discipline.
Structure, Rhetoric, and Language			
How is the reader engaged? Is the language used appropriate and effective? How is the statement organized and presented?	No overall structure is present. Statement is a collection of disconnected statements about teaching. Jargon is used liberally	The statement has a structure and/or theme that is not connected to the ideas actually discussed in the statement, or, organizing structure is weak and does not	The statement has a guiding structure and/or theme that engages the reader and organizes the goals, methods, and assessments articulated in the statement.

This rubric was adapted from the work of Matt Kaplan, Chris O'Neal, Debbie Meizlish, Rosario Carillo, and Diana Kardia

	and not supported by specific definitions or examples. Needs much revision.	resonate within the disciplinary context. Examples are used but seem generic. May contain some jargon.	Jargon is avoided and teaching terms are given definitions. Specific, rich examples are used to bolster statements of goals, methods, and assessments. Grammar and spelling are correct.

This rubric was adapted from the work of Matt Kaplan, Chris O'Neal, Debbie Meizlish, Rosario Carillo, and Diana Kardia

Instructor:	Observer:	Date, Time, and Length:
Classroom Location:	Course:	
Primary Topic of Discussion:		
Teaching Medium (e.g. Whiteboard, chalkboard, Doc Cam, etc.)	How was Technology Used?	
Approximate # of Students:		
What Does the Instructor Want the Observer to Focus on or Pay Particular Attention to?		

COVER PAGE

Basic Classroom Management and Organization of Lesson

Category	0	1	2	3	Comments
1. Preparation and Organization	Poorly organized, lacks lesson preparation.	Difficult to follow lesson; goals of lesson are not clear	Lesson is somewhat organized, goals are clear, and instructor demonstrates preparation	The structure of the lesson is well organized and effective in achieving the goals of the lesson	
2. Verbal Articulation	Impossible to comprehend	Difficult to comprehend; requests for clarification	Articulates the lesson material sufficiently well	Spoken language used effectively; students can easily understand	
3. Instructor's Presented Work (Handouts and presented material)	Presented work is very poor, lacks organization, or illegible	Presented work is somewhat legible, somewhat organized, or lacks clarity	Presented work is clear and fairly well organized	Presented work is clear, very well organized, and easy to understand	
4. Enthusiasm for Teaching Students	Lacks interest, confidence, and encouragement	Some enthusiasm shown	Rather enthusiastic and confident about concepts taught	Shows much enthusiasm and appropriate confidence with concepts	
5. Communicated Lesson Context	*No* communication of how this lesson or content fits into the curriculum	*Little* communication of how this lesson or content fits into the curriculum	*Some* communication of how this lesson or content fits into the curriculum	*Clear* communication of how this lesson or content fits into the curriculum	

STUDENT

A) Students engaged in exploration/investigation/problem solving.

0	1	2	3
Students did not engage in exploration, investigation, or problem solving. There were either no instances of investigation or problem solving, or the teacher carried out the instances without active participation by any students.	Students seldom engaged in exploration, investigation, or problem solving. This tended to be limited to one or a few students engaged in problem solving while other students watched but did not actively participate.	Students sometimes engaged in exploration, investigation, or problem solving. Several students engaged in problem solving, but not the majority of the class.	Students regularly engaged in exploration, investigation, or problem solving. Over the course of the lesson, the majority of the students engaged in exploration/investigation/problem solving.

B) Students used a variety of means (modeling, drawings, concrete materials, manipulatives, etc.) to represent concepts.

0	1	2	3
There were either no representations included in the lesson, or representations were included but were exclusively manipulated and used by the teacher. If students watch the teacher manipulate representations and do not interact them themselves, it should be scored a 0 here.	The students manipulated or generated one representation of a concept.	The students manipulated or generated two or more representations to represent the same concept, but the teacher or students did not explicitly discuss the connections across the various representations, relationships of the representations to the underlying concept, and applicability or the efficiency of the representations.	The students manipulated or generated two or more representations to represent the same concept, and the teacher or students, as appropriate, explicitly discussed the connections across the various representations, relationships of the representations to the underlying concept, and applicability or the efficiency of the representations.

C) Students evaluated mathematical strategies.

0	1	2	3
Students did not evaluate mathematical strategies. This could happen for one of three reasons: 1) No strategies were used during the lesson; 2) Strategies were used but were not evaluated; 3) Strategies were evaluated by the teacher but this amounted to the teacher telling the students about strategy(ies); students did not actively participate.	An **individual student** evaluated mathematical strategies. This could have happened in a variety of scenarios, including in the context of partner work, small group work, or a student making a comment during direct instruction or individually to the teacher. The evaluation was limited to one student.	**At least two** but less than half of the students evaluated mathematical strategies. This could have happened in a variety of scenarios, including in the context of partner work, small group work, or a student making a comment during direct instruction or individually to the teacher.	**More than half** of the students evaluated mathematical strategies. This could have happened in a variety of scenarios, including in the context of partner work, small group work, or a student making a comment during direct instruction or individually to the teacher.

D) Students were involved in the communication of mathematical ideas to others (peer-to-peer).

0	1	2	3
No peer-to-peer (pairs, groups, whole class) conversations occurred during the lesson.	The lesson was primarily teacher directed and little opportunities were available for peer to peer (pairs, groups, whole class) conversations. A few instances developed where this occurred during the lesson but only lasted less than 5 minutes.	**Many** students engaged in conversations related to the mathematics that were respectful, on task, and supportive.	**Most** students engaged in conversations related to the mathematics that were respectful, on task, and supportive.

COMMENTS:

TEACHER

E) The teacher promoted precision of mathematical language.

0	1	2	3
The teacher makes repeated incorrect statements or incorrect names for mathematical objects instead of their accepted name.	The teacher makes a few incorrect statements or is sloppy about mathematical language, but generally uses correct mathematical terms.	The teacher "attends to precision" in all communication during the lesson, but the students are not always required to also do so.	The teacher "attends to precision" in regards to communication during the lesson. The students also "attend to precision" in communication, or the teacher guides students to modify or adapt non-precise communications to improve precision.

F) The teacher's questions encouraged student thinking.

0	1	2	3
Any questions asked by the teacher related to mathematical ideas were rhetorical in that there was no expectation of a response from the students.	Teacher questions consist of **"lower order"** knowledge based questions and responses focusing on recall of facts. **Memory**: recalls or memorizes information. **Translation**: changes information into a different symbolic form or situation.	The teacher's questions focused on **mid-levels** of mathematical thinking. **Interpretation**: discovers relationships among facts, generalizations, definitions, values and skills. **Application**: requires identification and selection and use of appropriate generalizations and skills	The teacher's questions focused on **high levels** of mathematical thinking. The teacher may ask lower level questions within the lesson, but this is not the focus of the practice. There are three possibilities for high levels of thinking: analysis, synthesis, and evaluation. ***Analysis:*** examines/ interprets the pattern, order or relationship of the mathematics; parts of the form of thinking. **Synthesis**: requires original, creative thinking. **Evaluation**: makes a judgment of good or bad, right or wrong, according to the standards he/she values.

G) In general, the teacher provided wait time.

0	1	2	3
The teacher **never** provided an ample amount of "think time" for the depth and complexity of a task or question posed by either the teacher or a student.	The teacher **rarely** provided an ample amount of "think time" for the depth and complexity of a task or question posed by either the teacher or a student.	The teacher **sometimes** provided an ample amount of "think time" for the depth and complexity of a task or question posed by either the teacher or a student.	The teacher **frequently** provided an ample amount of "think time" for the depth and complexity of a task or question posed by either the teacher or a student.

H) The teacher uses student questions/comments to enhance conceptual mathematical understanding.

0	1	2	3
The teacher **never** uses student questions/ comments to enhance conceptual mathematical understanding.	The teacher **rarely** uses student questions/ comments to enhance conceptual mathematical understanding. The focus is more on procedural knowledge of the task verses conceptual knowledge of the content.	The teacher **sometimes** uses student questions/ comments to enhance conceptual understanding.	The teacher **frequently** uses student questions/ comments to coach students, to facilitate conceptual understanding, and boost the conversation. The teacher sequences the student responses that will be displayed in an intentional order, and/or connects different students' responses to key mathematical ideas.

I) The teacher incorporates formative assessments (e.g., polling class, exits slips, quick check-in problems) to gauge student understanding during the lesson.

0	1	2	3
The teacher **never** uses formative assessments to gauge students' understanding.	The teacher **rarely** uses student formative assessments to gauge students' understanding.	The teacher **sometimes** uses formative assessments to gauge students' understanding.	The teacher **frequently** uses formative assessments to gauge students' understanding.

COMMENTS:

LESSON

J) The lesson included tasks that incorporate multiple representations (graphical, symbolic, modeling, drawings, concrete materials, different solution methods, etc.).

0	1	2	3
A lesson which focuses on a single procedure to solve certain types of problems and/or strongly discourages students from trying different techniques or incorporating multiple representations.	Multiple representations minimally occur, and are not explicitly encouraged; **or** *a single* task incorporates multiple representations that are explicitly encouraged.	Multiple representations are a significant part of the lesson, but are not the primary focus, or are not explicitly encouraged; **or** *more than one* task has multiple representations to a solution that are explicitly encouraged.	A lesson which includes *several* tasks throughout; or a single task that takes up a *large portion* of the lesson; with multiple representations which increases the cognitive level of the task for different students.

K) The lesson involved fundamental concepts of the subject to promote relational/conceptual understanding.

0	1	2	3
The lesson consists of several mathematical problems with no guidance to make connections with any of the fundamental mathematical concepts. This usually occurs with a teacher focusing on procedure of solving certain types of problems without the students understanding the "why" behind the procedures.	The lesson mentions ***some*** fundamental concepts of mathematics, but does not use these concepts to develop the relational/conceptual understanding of the students. For example, in a lesson on the slope of the line, the teacher mentions that it is related to ratios, but does not help the students to understand how it is related and how that can help them to better understand the concept of slope.	The lesson includes fundamental concepts, but the teacher/lesson misses several opportunities to use these concepts to build relational/conceptual understanding of the students with a focus on the "why" behind procedures included.	The lesson includes fundamental concepts, and the teacher/lesson uses these concepts to build relational/conceptual understanding of the students with a focus on the "why" behind any procedures included or encourages students to make use of and make sense of mathematical structure.

Were the learning goals explicit? YES NO

State the implicit or explicit learning goals:_____

_____

_____

_____

_____

L) Guided by your observations, in summary, the lesson was taught to meet the learning goals.

0	1	2	3
The lesson was ***not effective*** at meeting the learning goals	The lesson was ***somewhat effective*** at meeting *a few of* the learning goals	The lesson was ***somewhat effective*** at meeting *most of* the learning goals	The lesson was **very *effective*** at meeting most or all the learning goals

COMMENTS: